

A New Era – Open Innovation in the Automotive Ecosystem with Linux and Open Source Community

July 2014

Masashige Mizuyama

CTO of Automotive Infotainment Business Division, Panasonic Corp.

About Myself

- CTO of Automotive Infotainment Business since April 2013
- Architect, Director of mobile phone development ~March 2013



2005.6 Int'l Tech. Conference CELF, Yokohama



2006.4 Embedded Linux Conference, San Jose

Today's Agenda

- Current status of IVI
- Lessons Learned from Mobile phone experience
- Challenge for Open Source



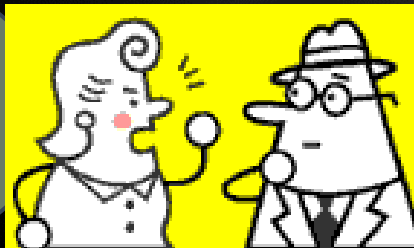
Current status of IVI



Situation is ...

- The new reference in end user's mind: Smartphone
➔ IT/Cloud Speed of evolution, Software Explosion
- IVI is spreading over the Cockpit
➔ High Reliability is a must for Safety

Speedy and
Efficient
Development



(Conflict)

Robust,
Stable,
Reliable
System

IVI is Expanding

Infotainment System



**Multi
Media**

Apps
(Music, Navi)

HMI

Platform

Cloud
Services

IVI System

IVI is Expanding

Infotainment System



Cockpit becomes "eCockpit"

Cloud
Services

Multi-
Media

Apps
(Music, Navi)



HMI

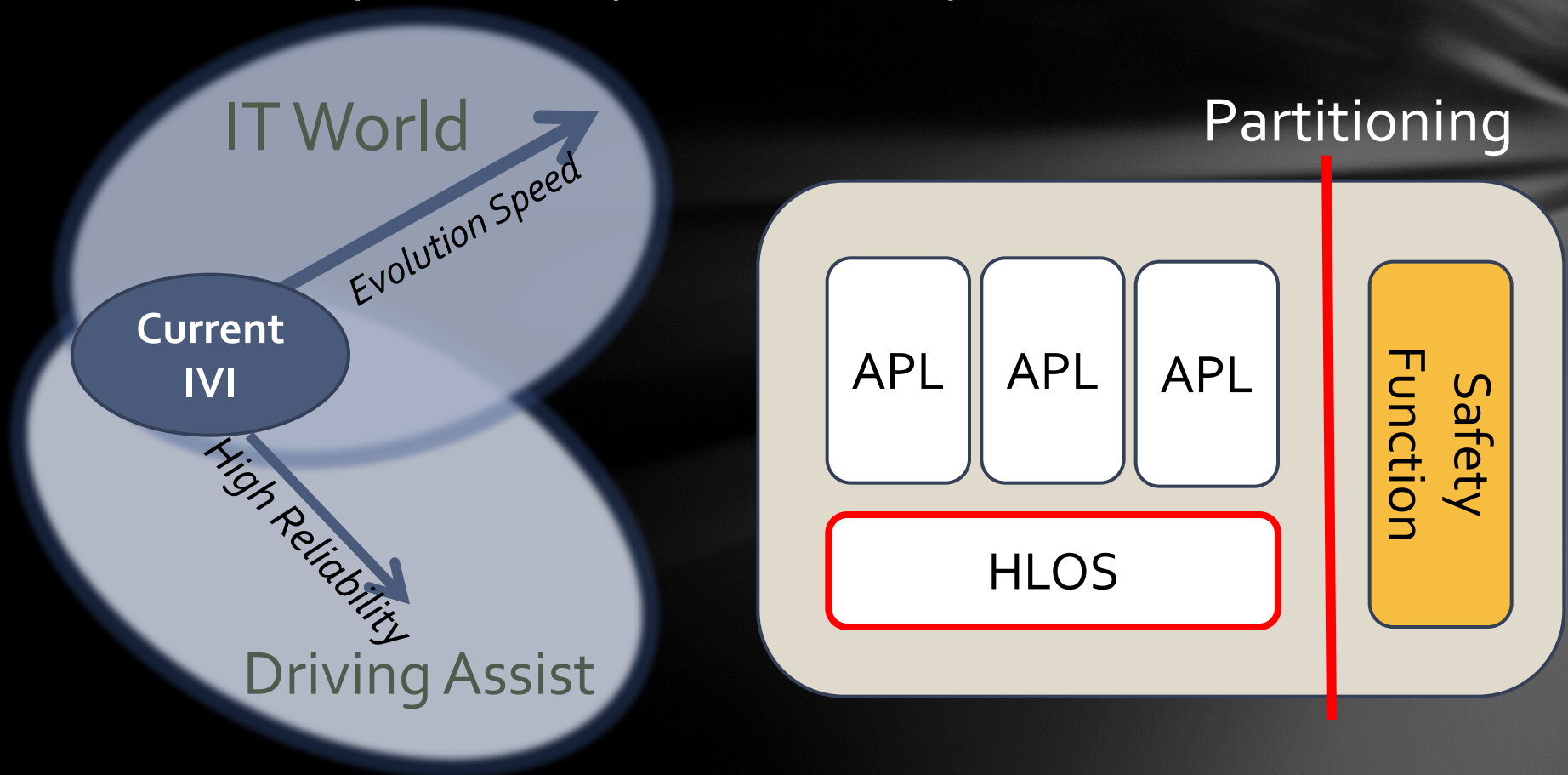
Platform

IVI System

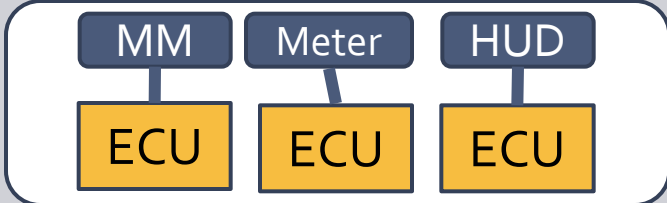
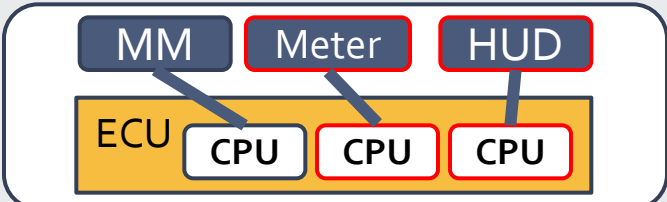
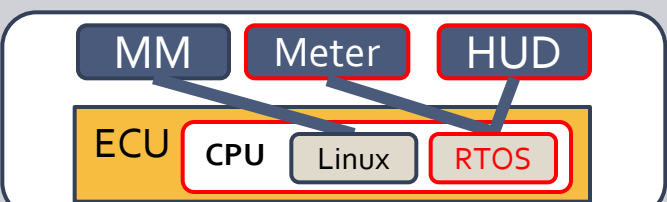
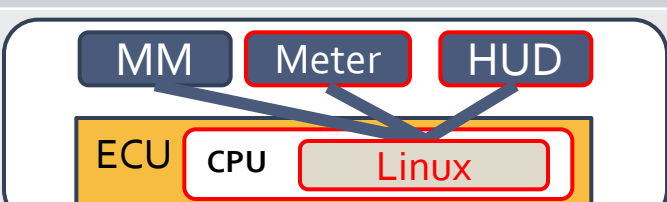
Panasonic

Our challenge in IVI Architecture

- Both Efficiency and Safety should be required.

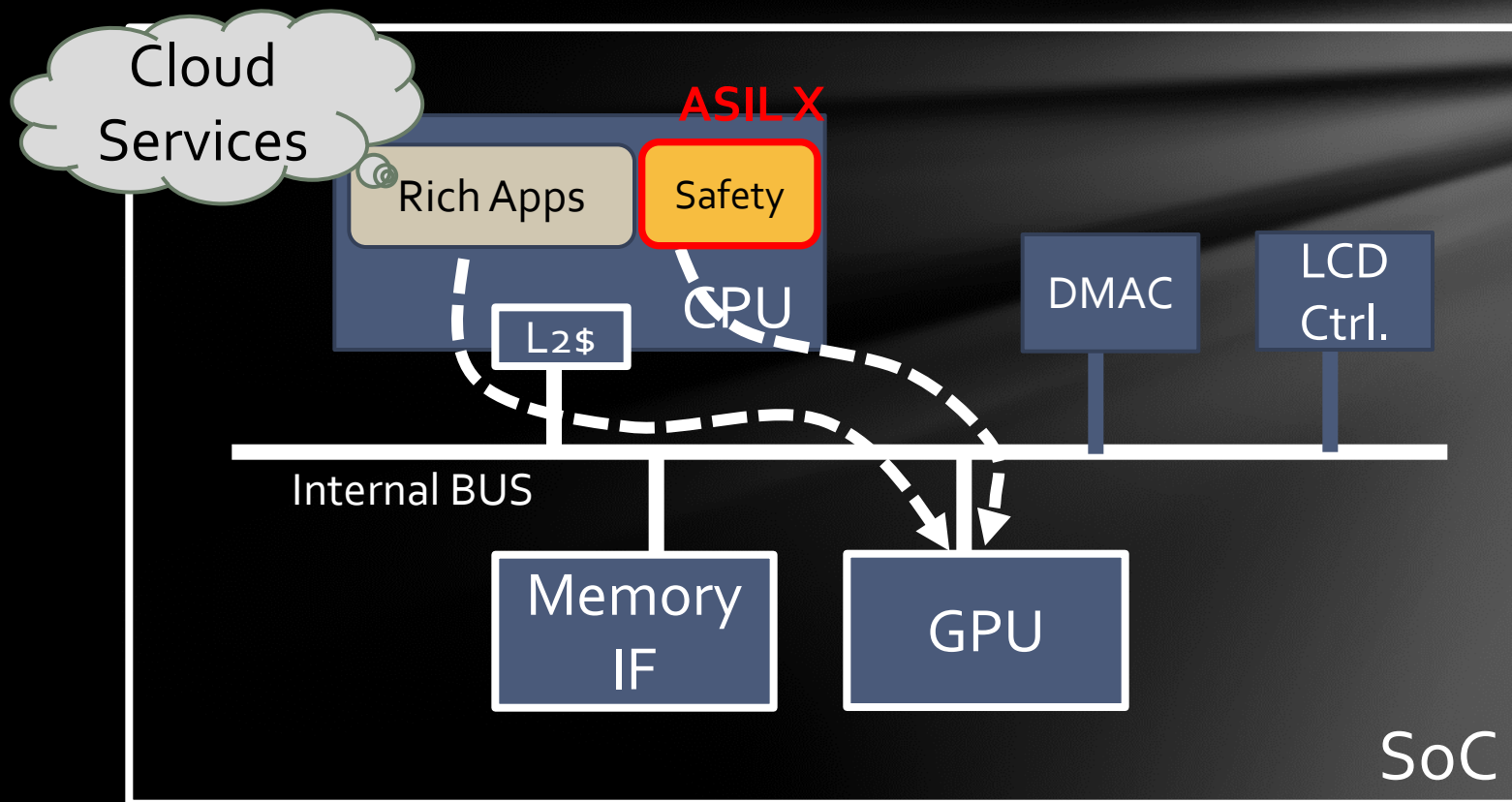


Options for Partitioning

	Options	Function Integrity	Cost	ASIL	Architecture
①	Separated Units	×	×	○	
②	Dedicated Multi-Core	△	△	○	
③	Hypervisor	○	○	△	
④	Linux	◎	○	?	

Issue still remains

Even if we partition the software on the CPU,
How about the other shared resources?

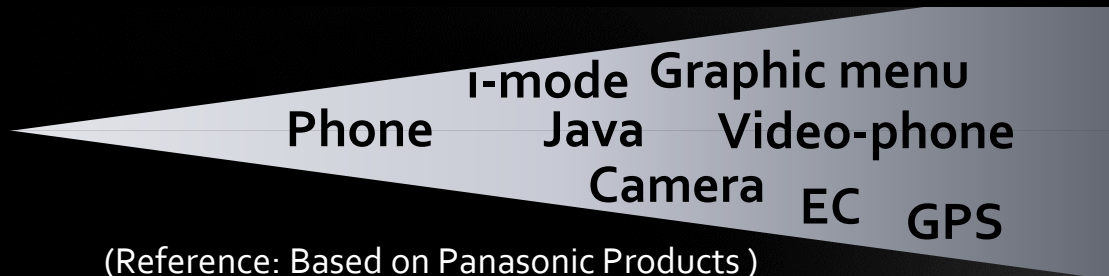
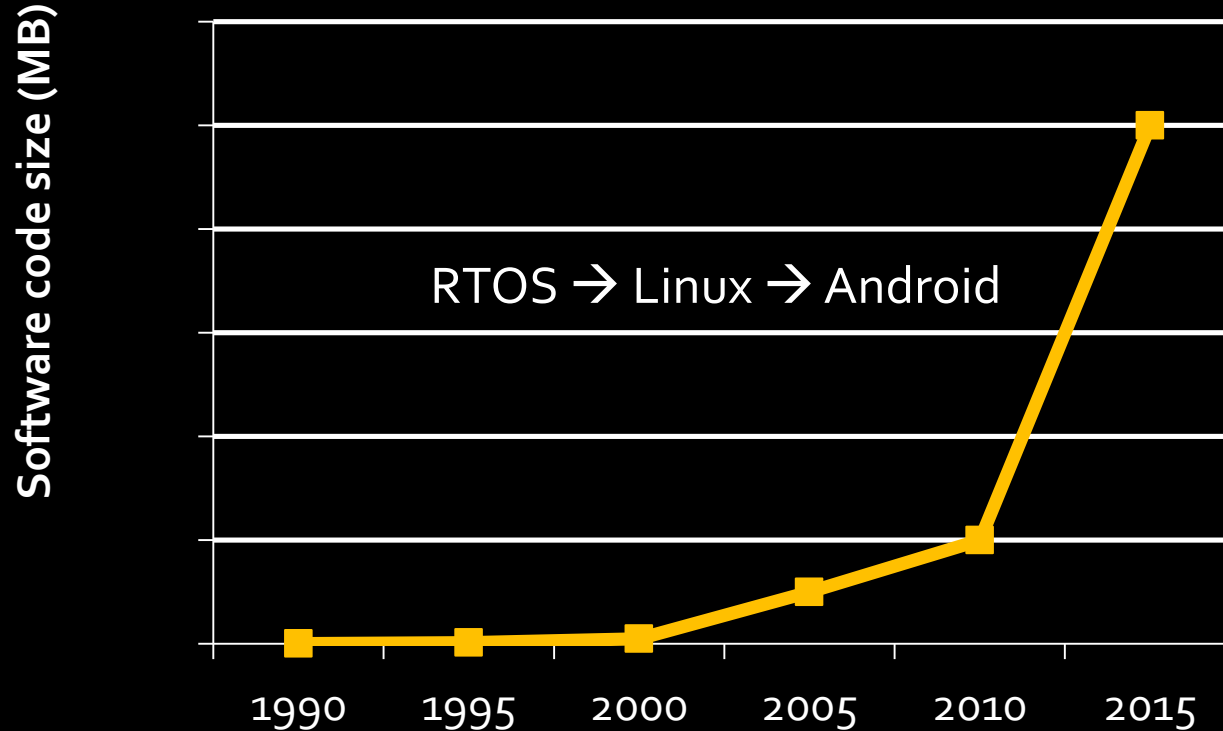


Lessons Learned from Mobile phone experience



Exploding Growth of Applications

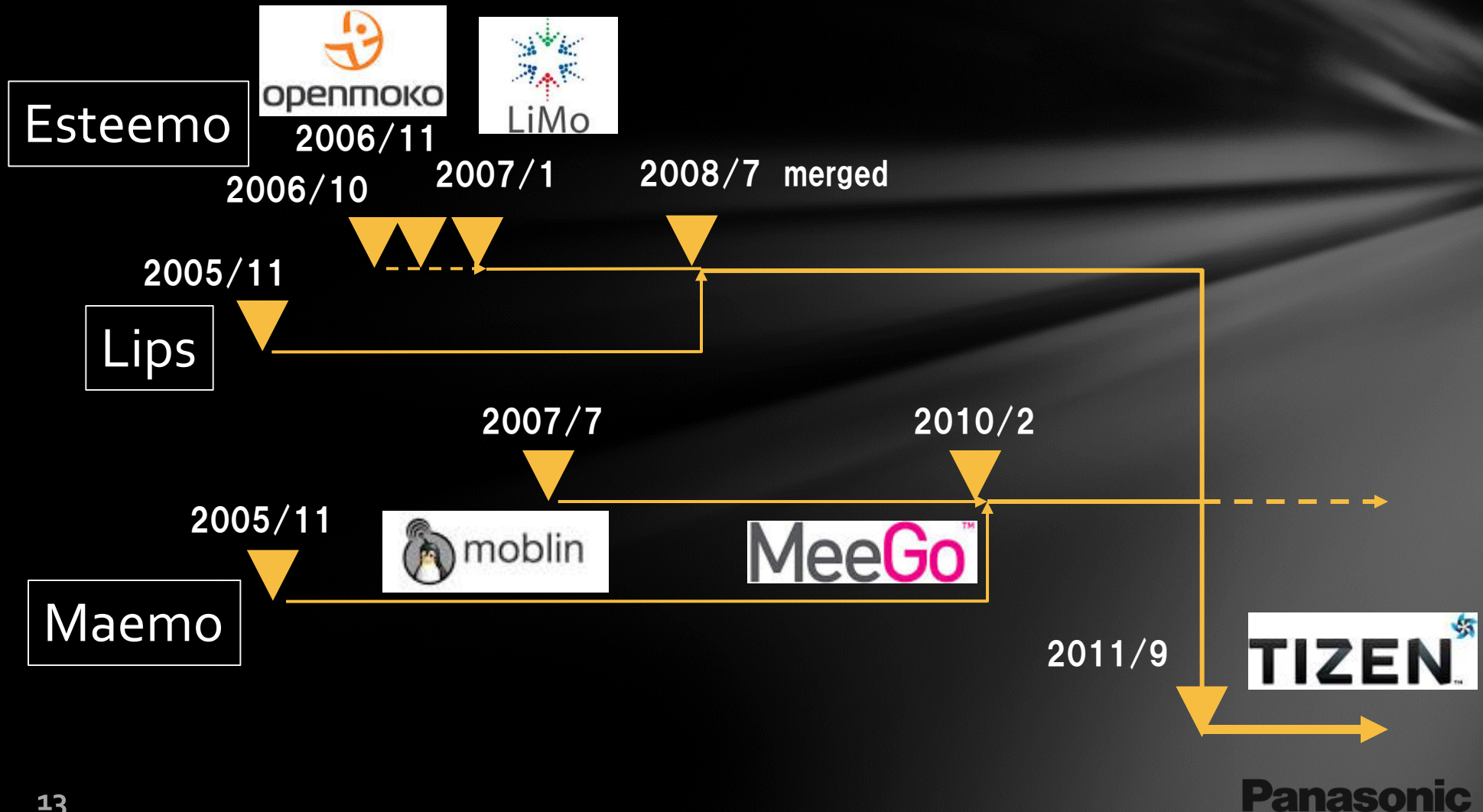
- History of Mobile phone



(Reference: Based on Panasonic Products)

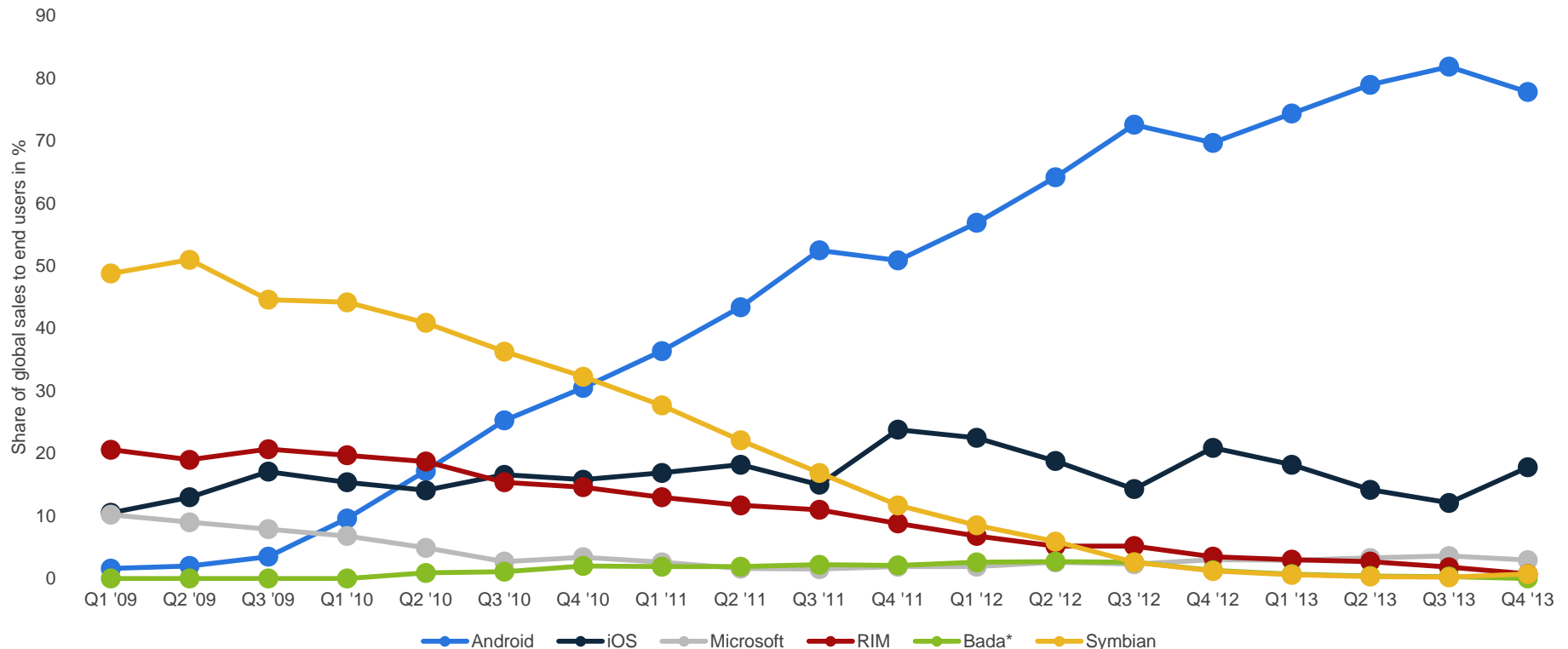


Races for Ecosystem



History says...

Global market share held by the leading smartphone operating systems in sales to end users from 1st quarter 2009 to 4th quarter 2013



(Reference: The Statistics Portal

<http://www.statista.com/statistics/266136/global-market-share-held-by-smartphone-operating-systems/>)

Challenge for Open Source

Infotainment looks like...

Infotainment System



CAN

Dead
Reckoning

...

Touch interface

Modem GPS

Movie FOTA Music

Graphics Sound

Voice Recognition

...

Smartphone



Voice
Call

SMS

...

Shifting Gear to IT Speed

IVI can no longer be developed by a single company.

Can

Open Innovation

Open Source Development

be the remedy?

To Use Existing Open Source Software

To Grow YOUR Assets in Open Source Proj.

Does Open Source Work for Automotive?

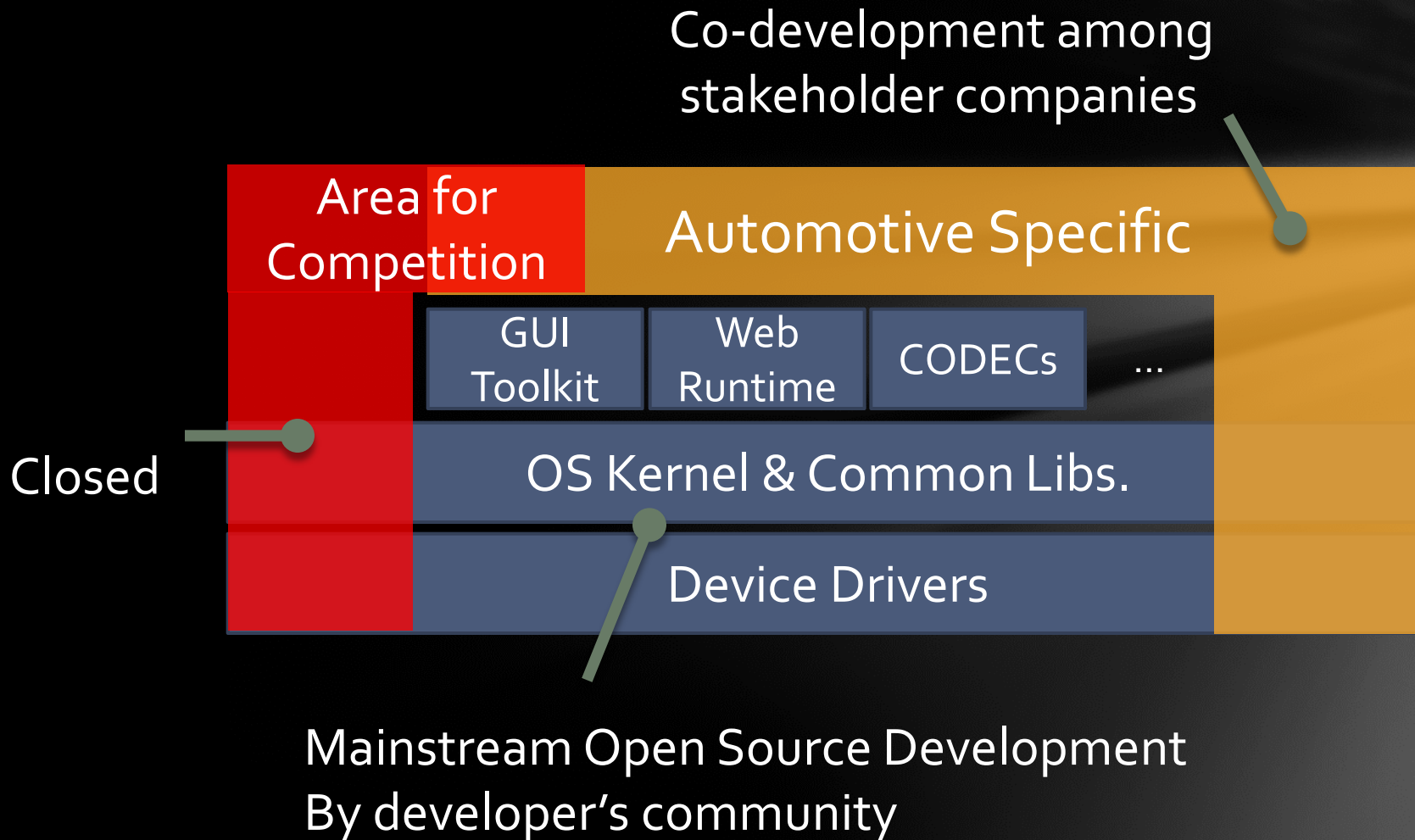
Successful Open Source Projects:

Their Own HW to Enjoy Improvements

Source Code First

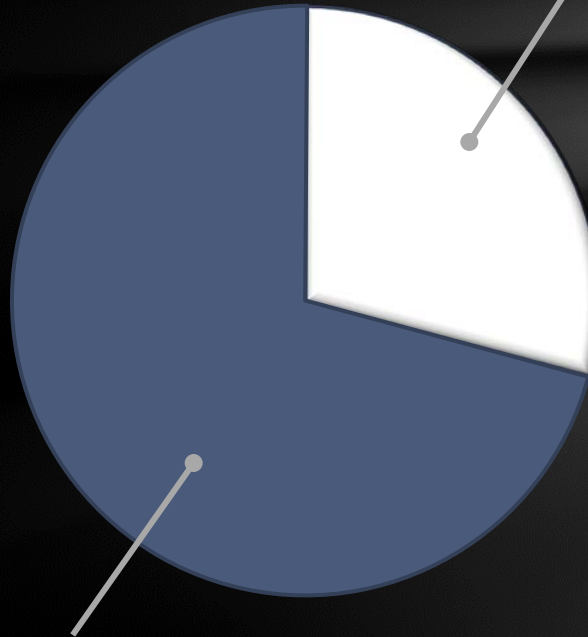
Simple Objective --- Solving Single Problem Area

Automotive Specific Area – Open Source?



Automotive Specific Area – Collaboration?

Core part of unique value of your product



Important pieces for whole system to work.

Still, Why Open for “Joint Development” ?

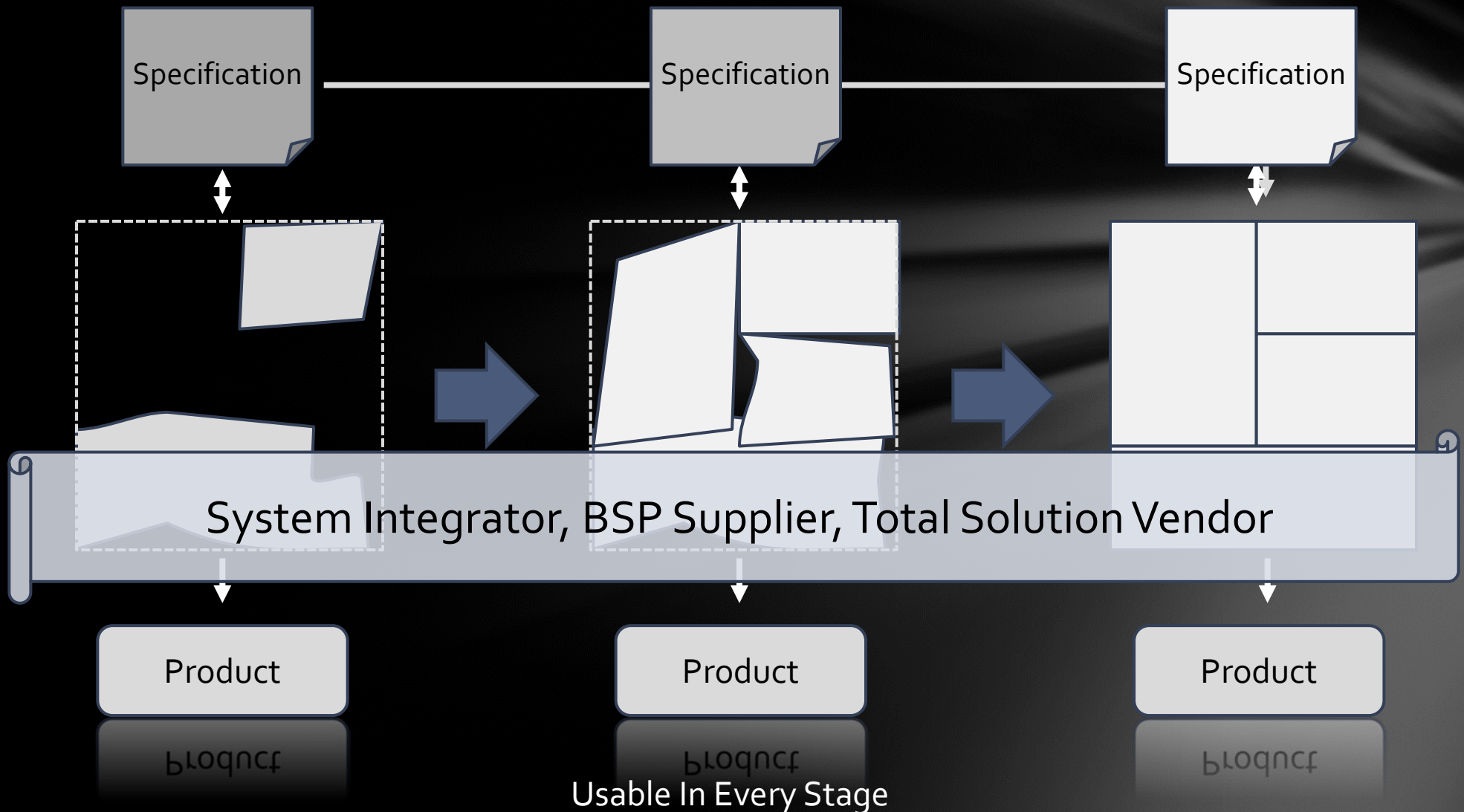
Closed Party, Closed Project

- Commitment for quality, schedule
- Project reliability
- No Free Riders

Open Source Project

- More Chance to have various partners
- Many eyes & hands for Quality, Schedule
- Motivation!

Path to the “Off-the-Shelf” Platform



Conclusion

Now, Standard in End User's Mind is Smartphone.

Our Progress Is Too Slow in Most Cases.

*If IVI Ecosystem doesn't Get Working in 3-4 Years,
Smartphone, Dongle or Arbitrary Extension Unit
(or Some Other Ecosystem) will do it.*

Speed is Critical.

Let's Implement the Source Code and Make It Work!

Thank You !!

Appendix: References of images in this presentation

<http://pixabay.com/ja/%E8%BB%8A-%E3%83%9F%E3%83%A8%E3%83%BC%E6%A9%8B-%E3%83%90%E3%83%83%E3%82%AF%E3%83%9F%E3%83%A9%E3%83%BC-172876/>

<http://pixabay.com/ja/%E3%83%9F%E3%83%A9%E3%83%BC-%E8%BB%8A-%E3%82%AC%E3%83%A9%E3%82%B9-%E3%83%AA%E3%82%A2%E3%83%93%E3%83%A5%E3%83%BC-%E3%83%9F%E3%83%A9%E3%83%BC-%E9%A7%86%E5%8B%95-71418/>

<http://pixabay.com/ja/%E3%82%B9%E3%83%94%E3%83%BC%E3%83%89-%E3%82%B9%E3%83%94%E3%83%BC%E3%83%89-%E3%82%BB%E3%83%B3%E3%82%B5%E3%83%BC-%E3%83%80%E3%83%83%E3%82%B7%E3%83%A5-%E3%83%9C%E3%83%BC%E3%83%89-%E7%B6%99%E6%89%8B-%E3%82%BF%E3%82%B3%E3%83%A1%E3%83%BC%E3%82%BF-253650/>

<http://news.panasonic.net/images/o1ELUGAWATER.jpg>

<http://panasonic.jp/car/navi/products/Lseries/PRD/design/index.html#o1>